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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/533,550

11/17/2005

Andrew Graham

1432.116.101/P29858

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45782 7590 04/19/2007  
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EXAMINER

LOPEZ ESQUERRA, ANDRES

ART UNIT

PAPER NUMBER

2818

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/19/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/533,550

Applicant(s)

GRAHAM ET AL.

Examiner

Andrés López-Esquerro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 22-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 04/29/2005
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "sub region of the via hole that does not have the nanostructure" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### **Specification**

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.
3. The disclosure is objected to because of the following informalities: In page 15 line 28 instead of "conductive layer 103", it should read –conductive layer 105--.

Appropriate correction is required.

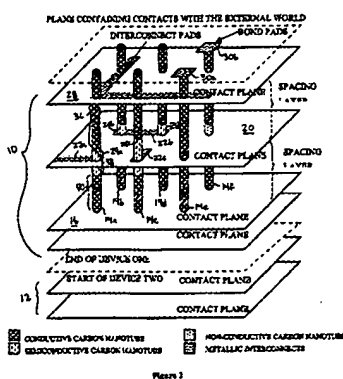
### **Claim Rejections - 35 USC § 102**

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 22 – 25, 30, 33 – 36, and 38 – 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Mancevski US 2001/0023986 (Mancevski).**



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6. As for claims 22 and 41 – 42, Mancevski discloses (Page 3 [0040]) and shows in

Fig. 2 a carbon nanotube transistor comprising:

- a. a first electrically conductive layer (16);
- b. a middle layer /spacing layers(10), formed partially from dielectric material, on the first electrically conductive layer;
- c. a second electrically conductive layer on the middle layer (28), and;
- d. a nanostructure (14) integrated in a via hole/vertically aligned holes introduced into the middle layer, the nanostructure further comprising a first end portion that is coupled to the first electrically conductive layer and a second end portion that is coupled to the second electrically conductive layer (as shown in the Fig, 2 both ends of the nanotubes are imbedded in the contact layer);
- e. wherein the middle layer, between two adjacent dielectric sublayers/spacing layers, has a third electrically conductive layer (20), the thickness of which is less than the thickness of at least one of the dielectric sublayers (as shown in Fig 2, the contact plane is thinner than the spacing layers).

7. As for claim 43, it is inherent in view of the device disclose in Mancevski and claimed by the applicant since the claims only provide or form the different structures in the device, all of which are anticipated by Mancevski.

8. As for claim 23, Mancevski discloses (Page 3 [0041]) that the catalyst (54) is deposit in the inner walls of the hole that start at the contact plane on the bottom

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(applicant's limitation of catalyst material between the first conductive layer and the nanostructure).

9. As for claims 24 – 25, Mancevski shows in Fig. 2 that the third conductive layer/contact layer (20) surrounds the nanostructure in the middle of the transistor as well as it been thinner than both dielectric layer/spacing layers.

10. As for claims 33 - 36, Mancevski discloses (Page 3 [0040], Page 8 [0092]) the nanostructure been a carbon nanotube and the catalyst been Fe, Ni, or Co.

11. As for claim 38, Mancevski discloses (Page 2 – 3 [0022]) the use of a insulating material where the nanostructure is present starting from where it is formed all the way through the hole (applicant's limitation of via hole been filled by an electrically insulating spacer.

12. As for claims 39 – 40, Mancevski discloses (Page 6 [0068]) that the structure is made out of doped silicon and metal films (applicant's limitation of the structure been dielectric material, metallic material, and the nanostructure and the limitation of made of polycrystalline or amorphous material.

### ***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**15. Claims 26 – 28, 30 – 32, and 37 rejected under 35 U.S.C. 103(a) as being unpatentable over Mancevski.**

16. As for claim 26, Mancevski discloses (Page 8 [0102]) and shows in Fig. 2 that the construction of the nanostructure includes both ends as source and drain regions. It further discloses the middle part includes a gate electrode.

17. Mancevski fails to explicitly disclose the use of a gate-insulating region with the transistor in a ring structure. Mancevski discloses the claimed invention except for the use of a gate-insulating region with the transistor as a ring structure. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to the use a gate-insulating region made out of a insulating material with the transistor since it was known in the art that to use a gate insulation layer when creating a transistor, specially a MOSFET, the ring structure will also be obvious since it is a third dimension spherical shape, as shown in Fig 2, and therefore the shape of the insulator most cover the surrounding of the nanostructure which would be a ring.

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18. As for claim 27, Mancevski discloses the claimed invention except for the additional electrically conductive layer and ring structure in the structure. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to add the additional electrically conductive layer and ring structure in the structure, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

19. As for claim 28, Mancevski shows in Fig. 2 that creation of a second transistor (12) next to the original transistor (10).

20. As for claim 30, Mancevski discloses (Page 6 [0068]) that the structure is made out of doped silicon and metal films. Mancevski discloses the claimed invention except for the use of silicon dioxide, silicon nitride, or silicon dioxide doped with potassium ions for the dielectric material. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to use of silicon dioxide, silicon nitride, or silicon dioxide doped with potassium ions for the dielectric material, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

21. As for claim 31, Mancevski discloses (Page 6 [0068]) that the structure is made out of doped silicon and metal films. Mancevski discloses the claimed invention except for the use of polysilicon, tantalum, titanium, niobium, or aluminum for the third and additional electrically conductive layer. It would have been obvious to one having



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ordinary skill in the art at the time of the invention was made to use of polysilicon, tantalum, titanium, niobium, or aluminum for the third and additional electrically conductive layer, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

22. As for claim 32, Mancevski discloses (Page 6 [0068]) that the structure is made out of doped silicon and metal films. Mancevski discloses the claimed invention except for the use of tantalum, tantalum nitride, titanium, molybdenum, aluminum, titanium nitride, or ferromagnetic material as the first and second electrically conductive layer. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to use of tantalum, tantalum nitride, titanium, molybdenum, aluminum, titanium nitride, or ferromagnetic material as the first and second electrically conductive layer, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

23. As for claim 37, it is an obvious variation of creating the nanostructure and the catalyst needed for that type of material.

24. If applicants disagrees, a restriction requirement might be then in order.

**25. Claim 29 rejected under 35 U.S.C. 103(a) as being unpatentable over Mancevski in view of Martin et al. US 2001/0019279 (Martin).**

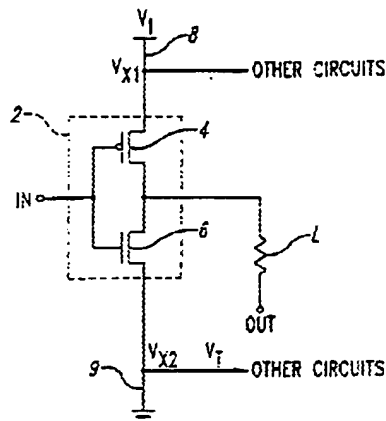


Fig. 1

27. As for claim 31, Mancevski discloses (Page 6 [0068]) that the structure is made out of doped silicon and metal films. Mancevski discloses the claimed invention except for the use of polysilicon, tantalum, titanium, niobium, or aluminum for the third and

27. As for claim 31, Mancevski discloses (Page 6 [0068]) that the structure is made out of doped silicon and metal films. Mancevski discloses the claimed invention except for the use of polysilicon, tantalum, titanium, niobium, or aluminum for the third and

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additional electrically conductive layer. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to use of polysilicon, tantalum, titanium, niobium, or aluminum for the third and additional electrically conductive layer, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

### ***Conclusion***

28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5,362,972, US 4,903,089, US 5,308,778, US 5,286,674, and US 5,398,200.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrés López-Esquerro whose telephone number is (571) 272-9753. The examiner can normally be reached on M - Th 6:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272 - 1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrés López-Esquerro  
Examiner  
Art Unit 2818

ALE



*Andrés López-Esquerro*

*Andrés López-Esquerro  
Primary Examiner*